

REMARKS

The Examiner's action dated June 17, 2004, has been received, and its contents carefully noted.

This application contains claims 1-42. Claims 1, 10, 12, 15, 24, 26, 29 and 38 are hereby amended. No new matter has been added. Reconsideration is respectfully requested.

Claims 1, 2, 7, 10, 12, 15, 16, 21, 24, 26, 29, 30, 35, 38 and 40 were rejected under 35 U.S.C. 103(a) over Chakraborty et al. (U.S. Patent 5,995,695) in view of Ibison et al. (U.S. Patent 5,506,913). Applicant has amended independent claims 1, 12, 15, 26 and 29 in order to clarify the distinction of the present invention over the cited art. Dependent claims 10, 24 and 38 have also been amended in order to more clearly recite distinguishing features of the present invention.

Claim 1, as amended, recites a method for locating symbols arranged in a plurality of parallel rows in an image. The arrangement of symbols (such as alphanumeric characters) in multiple rows of this sort is characteristic of address blocks on parcels, for example (page 13, lines 20-23 in the specification). To locate the symbols, the image is first smeared, and line segments are then fitted through the edge points of features in the smeared image. The location of the rows of symbols in the image is identified by finding a

certain group of these line segments that are in mutual proximity and are mutually approximately parallel. The claim has been amended to state more specifically the characteristics that distinguish this particular group of line segments: It comprises at least a predetermined number of segments that run along respective rows of the symbols, at different, respective distances from a given origin. Groups of line segments of this sort are shown in Fig. 5 of the present patent application. The added limitations in claim 1 find literal support in the specification on page 14, lines 1-4 and 23-25 (together with the definition of the distance coordinate p on page 12, lines 19-20).

Chakraborty describes a method of searching and extracting text information from drawings. The image of the drawing is discriminated between text regions and lines by grouping pixels into blocks, and comparing the blocks with a predetermined format to identify text regions (abstract). Parameters that may be used for this purpose include the width and height, aspect ratio, area and ratio of black pixels of each block (col. 6, lines 14-36). Lines in the image are identified and removed before and/or after identifying the text regions (col. 2, lines 29-32), in order to facilitate application of OCR to the text regions (col. 3, lines 27-29). In other words, Chakraborty identifies lines that are parts of

the drawing image that do not belong to the text regions. In contrast, line identification is an integral part of identifying the rows of symbols in the method of claim 1.

Ibison describes a method of recognizing an irradiation field, based on automatic determination of the location of the boundary between signal and shadow regions in an X-ray image (abstract). To find the boundary, Ibison groups lines into clusters by finding lines that are approximately collinear and have extrapolations that overlap or touch (col. 13, lines 44-64). Ibison shows an example of this sort of line clustering in Fig. 3 (col. 8, lines 4-6). As can be seen in this figure, the line clusters found by Ibison represent the edges of a rectangular boundary and do not meet the criteria of amended claim 1. Ibison's lines have nothing to do with locating rows of symbols in an image and could not be used effectively to locate such rows.

Thus, neither Chakraborty nor Ibison teaches or suggests finding at least a predetermined number of segments that run along respective rows of symbols at different, respective distances from an origin, as required by amended claim 1. The cited references use line identification in different ways from the present invention and for different purposes. For this reason, claim 1, as amended, is believed to be patentable over the cited art.

Independent claims 15 and 29, respectively, recite apparatus and a computer software product for locating symbols in an image, based on principles similar to the method of claim 1. These claims were rejected on the same grounds as claim 1 and have been amended in like fashion. Amended claims 15 and 29 are therefore believed to be patentable for the reasons stated above.

Independent claims 12 and 26, respectively, recite a computer-implemented method and apparatus for reading characters arranged in a plurality of parallel rows on an object. These claims were rejected on similar grounds to claim 1 and have been amended in like manner. Thus, for the reasons stated above, amended claims 12 and 26 are believed to be patentable over the cited art.

In view of the patentability of the above-mentioned independent claims, dependent claims 2, 7, 10, 16, 21, 24, 30, 35, 38 and 40 are believed to be patentable, as well. Furthermore, Applicant has amended claims 10, 24 and 38 to clarify that the line segments are selected for inclusion in the group (corresponding to the parallel rows of symbols) such that all the end points of all the line segments in the group are within a predetermined range of one another. This feature of the present invention is also illustrated in Fig. 5, and is described in the specification on page 14, lines 14-20. By

contrast, for Ibison's purposes it is sufficient that a single endpoint of one line be in proximity to a single endpoint of another line. Thus, claims 10, 24 and 38, as amended, are believed to be independently patentable over the cited art.

Each of dependent claims 3-6, 8, 9, 11, 13, 14, 17-20, 22, 23, 25, 27, 28, 31-34, 36, 37, 39, 41 and 42 was rejected under 35 U.S.C. 103(a) over Chakraborty in view of Ibison and further in view of one of Tamaoki (Japanese patent publication 10-224626), Chiba et al. (Japanese patent publication 08-272965), Yamazaki (U.S. Patent 6,633,409), Pasco et al. (U.S. Patent 6,064,778), Snyder et al. (U.S. Patent 6,195,474), Messelodi et al. ("Automatic Identification and Skew Estimation of Text Lines in Real Scene Images") and Moed et al. (U.S. patent 5,770,841). In view of the patentability of the amended independent claims in this application, however, as explained above, these dependent claims are also believed to be patentable.

Furthermore, notwithstanding the patentability of the independent claims in this application, the dependent claims are believed to recite independently-patentable subject matter. For the sake of brevity, Applicant will not argue the independent patentability of the dependent claims at this point, but will cite only a number of specific examples:

Claim 3 adds to claim 1 the limitation that the image is binarized before the smearing step, using selective binarization so as to preserve the features of the image that have stroke widths in a predetermined range that is associated with the symbols. In rejecting this claim, the Examiner cited Tamaoki, who describes a method for choosing between high and low binarization threshold levels in order to avoid cutting the continuity of black picture elements (abstract, lines 1-6). The threshold, in other words, relates to the picture as a whole, and does not relate selectively to any particular range of stroke widths. Thus, claim 3 is believed to be independently patentable over the cited art, as are claims 17 and 31.

As another example, claim 4 adds to claim 1 the limitation that the image is smeared by applying a morphological expansion operator to the image features. In rejecting this claim, the Examiner cited Chiba, who describes application of a morphological expansion operator to an edge image for judging the quality of an image (abstract, lines 1-11). The purpose of the operation is not to smear the image, but rather the opposite: to distinguish characters from "blots" in the image (paragraph 0004). Chiba teaches away from smearing the image, since smearing would make the characters indistinguishable from the blots. Thus, claim 4 is

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believed to be independently patentable over the cited art, as are claims 18 and 32.


Similar arguments may be made with regard to the other dependent claims.

Applicant believes the amendments and remarks presented hereinabove to be fully responsive to all of the grounds of rejection raised by the Examiner. In view of these amendments and remarks, Applicant respectfully submits that all of the claims in the present application are in order for allowance. Notice to this effect is hereby requested.

In response to the request presented in section 1 on page two of the Action, attached hereto is a signed copy of the letter entitled: INFORMATION DISCLOSURE STATEMENT, filed October 2, 2001.

Respectfully submitted,

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